an n-type diamond semiconductor layer;

a p-type diamond semiconductor layer formed while maintaining a predetermined interval between it and said n-type diamond semiconductor layer; and

a high-quality undoped diamond semiconductor layer sandwiched between said n-type diamond semiconductor layer and said p-type diamond semiconductor layer and fabricated using a raw gas including a methane gas and a hydrogen gas in a microwave plasma chemical vapor deposition method, in which the methane gas has a concentration of not more than 2.0%,

wherein an exciton light emission that varies nonlinearly according to a current value is output from said undoped diamond semiconductor layer when current is injected to respective electrodes formed on said n-type and p-type diamond semiconductor layers.

8. (Amended) A diamond semiconductor light-emitting device comprising:

a high-quality n-type diamond semiconductor layer fabricated using a raw gas including a methane gas and a hydrogen gas in a microwave plasma chemical vapor deposition method, in which the methane gas has a concentration of not more than 2.0%;

a high-quality p-type diamond semiconductor layer formed in contact with said n-type diamond semiconductor layer and fabricated using a raw gas including a methane gas and a hydrogen gas in a microwave plasma chemical vapor deposition method, in which the methane gas has a concentration of not more than 2.0%; and

an activation region layer formed in an interface between said n-type diamond semiconductor layer and said p- type diamond semiconductor layer,

wherein an exciton light emission that varies nonlinearly according to a current value is output from the activation region layer when current is injected to respective electrodes formed on said n-type and p-type diamond semiconductor layers.

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